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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/758,396

01/16/2004

Ryoichi Kajiwara

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EXAMINER

CHAMBLISS, ALONZO

ART UNIT

PAPER NUMBER

2814

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

12/19/2006

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/758,396

Applicant(s)

KAJIWARA ET AL.

Examiner

Alonzo Chambliss

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 1/16/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>11/27/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The amendment filed on 10/10/06 has been fully considered and made of record in the instant application.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 11/27/06 was filed before the mailing date of the non-final rejection on 12/14/06. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Response to Arguments

3. Applicant's arguments with respect to claims 9-24 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

4. Claim 11 is objected to because of the following informalities: the word -- the -- should appear in front of " second electrode " on line 4. Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 9-12, 14-16, 18, 19, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kasem et al. (US 6,249,041) in view of Berndlmaier et al. (US 5,033,851).

With respect to Claim 9, Kasem discloses a semiconductor substrate 12, 42, 62, or 82 (i.e. chip cut from a substrate or wafer) and a first electrode 14, 44, or 64 (i.e. containing an Al layer as a main component) provided on a front plane of the semiconductor substrate 12, 42, 62, or 82. A second electrode 16 provided on a rear plane of the semiconductor substrate 12, 42, 62, or 82. A first metallic member 18a, 18b, or 48a,48b or 68a,68b is disposed over the first electrode 14, 44, or 64, wherein the first metallic member 18a, 18b, or 48a,48b or 68a,68b being electrically connected to the first electrode 14, 44, or 64. A second metallic member 22a,22b, or 52a,52b, or 72,72b is disposed under the second electrode 16, wherein the second metallic member

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22a,22b, or 52a,52b, or 72,72b being electrically connected to the second electrode 16. A plurality of bumps are disposed between the first electrode 14, 44, or 64 and the first metallic member 18a,18b, or 48a,48b or 68a,68b, wherein the first electrode 14, 44, or 64, the bumps, and the first metallic member 18a,18b, or 48a,48b or 68a,68b are electrically connected. The front plane of the semiconductor substrate 12, 42, 62, or 82 and each of bumps are connected via first electrode layer 14, 44, or 64 (see col. 2 lines 40-67; col. 3 lines 27-67, and col. 4 lines 1-10; Figs. 1A, 1B, 2A-2D, 3A, 3B, 4A, 4B, 5A-5D, 6A, and 6B). Kasem fails to disclose a plurality of Au bumps disposed between first electrode and the first metallic member plated with a precious metal film. The front plane to the substrate and each of the Au bumps are connected via an Au/Al alloy layer. However, Berndlmaier discloses a plurality of Au bumps 36 disposed between first electrode 12 and the first metallic member 50 with a precious metal film (i.e. gold). The front plane to the substrate 10 and each of the Au bumps 36 are connected via an Au/Al alloy layer formed during thermal compression bonding (see col. 3 lines 9-17 and col. 4 lines 15-42; Figs. 2 and 3). The word "plated" makes the claim a "product by process" claim. In a "product by process" claim, the claim is directed to the product per se, no matter how actually made, *In re Brown*, 190 USPQ 15 at 17 (footnote 3) and *In re Thorpe et al.*, 227 USPQ 964 (CAFC, 1985) all of which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Thus, Kasem and Berndlmaier have substantially the same environment of a

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lead attached to the electrode of a substrate via a bump. Therefore, one skilled in the art at the time of the invention would readily recognize incorporating a gold material for the bump of Kasem, since the gold materials would facilitate the bonding and reliable electrical connection between the lead and the substrate as taught by Berndlmaier.

With respect to Claims 10, 11, and 18, Kasem discloses wherein the substrate and parts of the first and second metallic members are covered by a resin body 54 or 74. A bottom face (i.e. a portion or the entire face) of the second metallic member is exposed from the resin body. The first metallic member comprises of a first portion and a second portion, the first portion is positioned over the first electrode and the second portion extends in direction from the first electrode to the second electrode. A bottom face of the second portion and a bottom face of the second metallic member are at a substantially same level (see Figs. 2D, 3B, and 4B, and 5D).

With respect to Claims 12 and 19, Kasem discloses wherein the semiconductor device is a surface mounting type device (see Figs. 1B, 2D, 3B, 4B, 5D).

With respect to Claims 14 and 21, Kasem discloses wherein each of the first and second metallic members contains a Cu core (see col. 3 lines 15-20).

With respect to Claims 15 and 22, Kasem discloses wherein the second electrode and second metallic member are connected via an Ag paste (see col. 4 lines 10-20).

With respect to Claims 16 and 23, Kasem discloses wherein the semiconductor substrate includes a MOSFET, wherein the first electrode is electrically connected to a source region of the MOSFET, and wherein the second electrode is electrically

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connected to a drain region of the MOSFET (see col. 2 lines 50-67 and col. 3 lines 1-20).

7. Claims 13 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kasem et al. (US 6,249,041) and Berndlmaier et al. (US 5,053,851) as applied to claims 9 and 18 above, and further in view of Brady et al. (US 5,134,460).

With respect to Claims 13 and 20, Kasem-Berndlmaier discloses the claimed invention except for the precious metal film containing Pd. However, it is well known in the semiconductor industry to substitute a Pd material for a Ag material as evident by Brady see col. 11 lines 10-15. Therefore, one skilled in the art at the time of the invention would readily recognize substituting a Pd material for the Ag material of Kasem-Berndlmaier, since the Pd material would facilitate the bonding of two conductive elements together as taught by Brady.

8. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasem et al. (US 6,249,041) and Berndlmaier et al. (US 5,053,851) as applied to claims 9 and 18 above, and further in view of Bencuya et al. (US 6,423,623).

With respect to Claim 24, Kasem-Berndlmaier discloses the claimed invention except for a substrate made of Si in a MOSFET device. However, it is well known in the semiconductor industry to have a substrate made of Si in a MOSFET device as evident by Bencuya (see col. 2 lines 6-14). Therefore, one skilled in the art at the time of the invention would readily recognize incorporate a substrate made of Si in the MOSFET device of Kasem-Berndlmaier, since the substrate made of Si would provide a reliable material in a high capacity production environment as taught by Bencuya.

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9. Claims 9, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bencuya et al. (US 6,423,623) in view of Berndlmaier et al. (US 5,033,851).

With respect to Claim 9, Bencuya discloses a semiconductor substrate 202 or 406 and a first electrode 420 provided on a front plane of the semiconductor substrate 202 and 406. A second electrode 408 provided on a rear plane of the semiconductor substrate 202 and 406. The first metallic member 206 is disposed over the first electrode 420, wherein the first metallic member 206 being electrically connected to the first electrode 420. A second metallic member 200 is disposed under the second electrode 200, wherein the second metallic member 200 being electrically connected to the second electrode 200. A plurality of bumps 204 or 404 are disposed between the first electrode 420 and the first metallic member 206, wherein the first electrode 420, the bumps 204 or 404, and the first metallic member 206 are electrically connected. The front plane of the semiconductor substrate 202 or 406 and each of bumps 204 or 404 are connected via first electrode layer 420 (see col. 2 lines 40-67, col. 3 lines 27-67, and col. 4 lines 1-10; Figs. 2-4). Bencuya fails to disclose a first electrode made of on a substrate made of Al layer as a main component. A plurality of Au bumps disposed between first electrode and the first metallic member plated with a precious metal film. The front plane to the substrate and each of the Au bumps are connected via an Au/Al alloy layer. However, Berndlmaier discloses a first electrode 12 (i.e. bond pad) made of on a substrate 10 made of Al layer as a main component. A plurality of Au bumps 36 disposed between first electrode 12 and the first metallic member 50 with a precious metal film (i.e. gold). The front plane to the substrate 10 and each of the Au bumps 36

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are connected via an Au/Al alloy layer formed during thermal compression bonding (see col. 3 lines 9-17 and col. 4 lines 15-42; Figs. 2 and 3). The word "plated" makes the claim a "product by process" claim. In a "product by process" claim, the claim is directed to the product per se, no matter how actually made, *In re Brown*, 190 USPQ 15 at 17 (footnote 3) and *In re Thorpe et al.*, 227 USPQ 964 (CAFC, 1985) all of which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Thus, Bencuya and Berndlmaier have substantially the same environment of a lead attached to the electrode of a substrate via a bump. Therefore, one skilled in the art at the time of the invention would readily recognize incorporating an aluminum and gold materials, respectively for the electrode and bump of Bencuya, since the aluminum and gold materials would facilitate the bonding and reliable electrical connection between the lead and the substrate as taught by Berndlmaier.

With respect to Claims 16 and 17, Bencuya discloses wherein the semiconductor substrate (i.e. made of Si) includes a MOSFET, wherein the first electrode is electrically connected to a source region of the MOSFET, and wherein the second electrode is electrically connected to a drain region of the MOSFET (see col. 2 lines 5-15).

The prior art made of record and not relied upon is cited primarily to show the product of the instant invention.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (571) 1927.

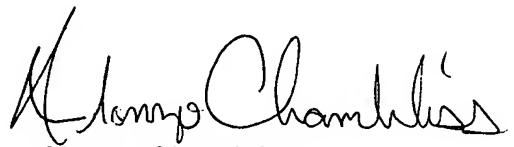
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system Status information for published applications may be obtained from either Private PMR or Public PMR. Status

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information for unpublished applications is available through Private PMR only. For more information about the PMR system see <http://pair-dkect.uspto.gov>. Should you have questions on access to the Private PMR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or EBC_Support@uspto.gov.

AC/December 14, 2006

A handwritten signature in black ink, appearing to read "Alonzo Chambliss". The signature is fluid and cursive, with the first name "Alonzo" and last name "Chambliss" clearly distinguishable.

Alonzo Chambliss
Primary Patent Examiner
Art Unit 2814